## Abstract

Dissertation examines mutual influence between cold dark matter sector and extended Higgs sector in two popular supersymmetric generalizations of the Standard Model (MSSM, NMSSM). The study is focused on the relic density and direct detection of dark matter as well as on the LHC search for new physics. Special emphasis has been placed on estimation of experimentally allowed parameter space of the models under consideration. Subsequently, Boltzmann equation for relativistic species is derived and applied to the analysis of hot dark matter in S. Weinberg's Higgs portal model. The results obtained with our method are also compared with some popular approximations of dark matter relic density calculation.